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EDITORIAL NOTES

GAS IN POST-WAR SCOTLAND

BEFORE now we have mentioned that we do not know how to assess the value of answers to many of the questionnaires set by planners for the land of milk and honey after the war. It is so easy to ask people to put a cross against what they would like, and so easy to make recommendations on paper from analysis of the votes obtained. And once again we find confusing the replies to a lengthy questionnaire embodied in a voluminous report to the Secretary of State for Scotland by the Scottish Housing Advisory Committee on "Planning Our New Homes." This report, which has just been published, runs to about 150 pages (type space 6 by 8 in.), and is copiously illustrated; it obviously represents a great deal of work, it is thoroughgoing, in parts enlightening; in regard to the place of gas in the future home across the Border, if occasionally condescending, it is by no means enthusiastic. Concerning which aspect, more anon.

We talk a great deal about the provision of hot water in the post-war home. This talk is more than justified, for present conditions are neither more nor less than deplorable—a fact brought into relief in the report we have mentioned. Our experience of rural water supply in England has been the reverse of happy, and has brought us some sense of proportion in thinking about the relative merits of instantaneous and storage systems, and the like, heated by gas, for surely it is desirable in the first place to have a supply of water. In 1938, 21,240 houses in the cities and burghs of Scotland were without an inside water supply. The position in rural areas was very much worse. Surveys of typical rural parishes—the surveys were made in 1936—showed that, of all rural houses dealt with, 67% had no internal water supply, and that in the case of 42% water had to be carried for a distance of more than 25 yards. The report estimates that in the rural areas in Scotland the houses with piped internal water supply represent only 33% of the total, so that as far as hot-water service is concerned, the basic essential is lacking—*i.e.*, the water supply itself. And we suppose that in the greater part of the rural areas in Scotland there is no gas supply. It would seem desirable to work on the "first things first" principle—provision of water and provision of means to heat it—and it seems apparent that for some time to come after the war solid fuel will be the heating means in these rural districts. We hope it will be smokeless and that the Gas Industry will supply it, taking a lively interest in its smokeless solid fuel market and the appliances for developing it.

We turn to cooking, reading in the report that except in rural areas where gas and electricity supplies are not available or are too expensive, cooking by solid fuel is comparatively uncommon —and we are not at all surprised at this statement, or with the further one that "where gas supplies are readily available the gas cooker is a standard fitment in the majority of houses in Scotland and the more modern types of this cooker have proved completely satisfactory." This complete satisfaction, however, does not appear to have appealed overmuch to the Committee in question, which adds that cooking by electricity has advantages from the point of view of cleanliness over cooking by any other form of power, and that electric stoves are very popular with working-class tenants. Nor does the matter end there. The Committee does not agree with the idea that where both gas and electricity can be made available at comparative cost houses built by local authorities should be piped for gas and wired for electricity, so that the tenant can use which she prefers. "As the only [*sic*] object of providing gas supply in domestic dwellings is to enable that supply to be used for cooking and heating purposes," the Committee—apart from one lone dissentient—considers the adoption of the policy of freedom of choice as superfluous and leading to unnecessary expenditure. For "electricity is universally to be preferred for lighting purposes," and the Committee imagines that all houses in areas where electricity is available for lighting at reasonable cost would be wired for heating and cooking, and argues that the local authority should determine the type of power to be used for cooking, and, if needs be, exclude gas altogether. Which causes us to query the Committee's grasp of the economic factors involved in fuel supply.

Regarding heating facilities, the Committee arrives at the conclusion, rather belatedly, we suggest, that open coal fires are not really necessary in every bedroom of a house. It recommends, however, a coal fire in one of the bedrooms and a coal fire in the living-room. This, by the way, as a minimum. As a sort of addendum is the statement that the use of gas and electric radiators for occasional heating has become very common in domestic dwellings in Scotland. Which statement is followed thus: Subject to reasonable charges for electricity supply, "the electric radiator is almost universally preferred on the ground that if the gas fire is to be really effective it requires an independent flue. Where electricity is the normal lighting agent we accordingly recommend that ample facilities should be provided in every room in the house to enable electric radiators to be used. . . . In appropriate schemes the provision of built-in panel electric fires in bedrooms without coal fireplaces might be considered."

We take it that, with certain embellishments, the Committee's conclusions were for the most part arrived at from study of the questionnaire it issued to men and women serving in the Forces and men and women drafted to war work in the factories, and this brings us back to the opening sentences of this note—the practical value which can be attached to answers to questions which in themselves are mere assumptions. But what does force itself home is the extraordinary willingness of the general public to subscribe to the desire to employ electricity for purposes to which, no doubt, they have previously not applied it, and of which they have no experience. "Assuming comparable costs, which method of cooking or heating would you like?" That is the sort of query; and the majority vote as far as the present report is concerned was in favour of electricity. The votes are there for anybody to scrutinize. Our own lack of faith in all this wishful-thinking business prevents any loss of confidence in the future place of gas and solid smokeless fuel in the homes of the future. Nevertheless a report such as the one under consideration, with its positive attitude to electricity and its wholly negative attitude to gas, adds reinforcement to our plea that the Gas Industry should call a halt to internal wrangling, and set out to educate the public on what it can accomplish and what it intends to do.

ACCEPTANCE FACTOR

IS the domestic lighting load fundamentally valuable to the Gas Industry as a whole? Should the Industry go all out for it? Has the Industry woefully neglected the advancement of this load, allowing it to slip away by default? We put these questions in view of a Paper by Mr. D. M. Thompson, of Burnley, to the Manchester Juniors, in which he seems to answer them all in the affirmative. We are considering, by the way, the domestic lighting load and not the public and street lighting load, which to our mind is another matter altogether. There are many gas undertakings in the country which have a substantial lighting

load, among which Burnley figures with its 10,000 gas-lighted houses; and it would be far from us to suggest that these undertakings should not continue to offer the satisfactory service which they are obviously giving, and keep their installations up to date and in the best possible condition. As an illuminant, *per se*, gas has its attractions; it gives a pleasing light. Also it combines light with warmth. Every gas-lighting burner is a source of heat. It is, in effect, a background heater of useful proportion, and the lighting season coincides with the heating season. Unquestionably the combined service is economical. There are plenty of examples to show that gas lighting is proving highly acceptable to the consumer. In spite of this, we cannot think that particular cases or particular districts should be taken as constituting a general rule, or should be a deciding factor in Gas Industry policy.

Presumably the basis for all types of planning can be epitomized as "fitness for purpose." In some areas and circumstances it may well be that this criterion is satisfied in regard to lighting by gas, but we doubt very much whether the Industry would be wise to press its claims in this direction on a nation-wide scale; we hope, indeed, that it will not feel called upon to do so because of the pleadings of those who wholly legitimately hold an excellent lighting load and equally strong views about it. For whatever we like to think of the virtues of domestic gas lighting, these virtues are not applicable universally, irrespective of the experiences of individual undertakings. The uses of gas domestically in spheres other than lighting have to our mind an immeasurably stronger case in their favour, and these uses ought, through education and knowledge, to be extended enormously after the war on the grounds of "fitness for purpose." Our aim must surely be to cultivate a high "acceptance factor" for gas, and do nothing to mar this factor by over-anxiety in pushing the lighting load. There is, we think, no anomaly in employing electrical power in the process of gas-making, and we discern no anomaly in combining the uses of gas and electricity in the home, one of these uses for electricity being lighting. Nor do we see anything out of place in, say, a neon sign to brighten the façade of a gas showroom. Perhaps it all boils down to first things first, and we cannot believe that domestic lighting ought really to constitute a "first thing" in the business of the Gas Industry after the war. On the contrary, we think that over-keenness in pursuit of this load on anything like a universal or unqualified basis is likely to do more harm than good in the long run.

PAST, PRESENT, FUTURE

THE quiet but convincing statement of Mr. J. F. Davies, Chairman of Radiation Ltd., at the annual meeting of the Company, must have been a source of satisfaction not merely to the stockholders, but to the Gas Industry generally. Founded a quarter of a century ago the organization's services to the Industry in the past have been of the greatest value; Mr. Davies made it abundantly clear that, through prudent administration, the Company's present position is abundantly sound and secure; and in regard to the future the Company is thinking and acting now in preparation, making provision for eventualities. A substantial monetary reserve is being set aside for meeting expenditure anticipated in the post-war period on development and re-equipment of the undertaking, so that it may emerge speedily with full facilities for satisfying the needs of the Industry and its consumers, for offering the public modern equipment of high standard and efficiency. And in this regard the comments of Mr. Davies on the matter of research of a continuous nature were very much to the point. The research record of the firm is an extraordinarily good one; its research and investigational work has benefited itself, it is true, but it is true also that this benefit has been that of the Gas Industry and the public as well. After the war the calls upon the manufacturers of gas equipment of all kinds will be heavy and insistent, and it is most encouraging to see how Radiation Ltd. is preparing in the present, and in the light of past experience, to meet the demands ahead.

Obituary

Sir Charles Vernon Boys, LL.D., F.R.S.

A Personal Note by W. J. A. Butterfield.

I first saw Prof. C. Vernon Boys about the year 1888, when he delivered a popular scientific lecture to the Oxford Junior Scientific Society. He already had that charming manner of speaking and capacity for making abstruse things simple which made him one of the most attractive popular lecturers among the leaders of science.

It was, however, only when I accepted a part-time position in 1898 with the Gas Referees that I was brought into intimate contact with the Professor, and began to understand something of his outstanding merit as a physicist. This intimacy and understanding continued unimpaired until shortly after the outbreak of the present war, when he gave up his London quarters and retired to his house near Andover.

He had been appointed one of the Gas Referees in 1897, and was busily engaged for a year or more in checking and standardizing the 10-candle lamp, which his colleague, Dr. A. Vernon Harcourt, had designed shortly before 1897. This standard of light was prescribed for official tests in London in May, 1898, and at the same time a table photometer was substituted for the bar previously used. Many of the mechanical details of this table photometer bore the impress of the aptitude for fine mechanics of Prof. Boys.

It was not, however, until tests of heating value were about to be introduced, at first for the collection of information only, that Prof. Boys found scope as a Gas Referee for his ability in designing scientific instruments. He was not favourably impressed by the gas calorimeters then in being, and decided to design one on altogether different lines. This was introduced officially in 1906, and, with slight modifications, has become the standard non-recording gas calorimeter for Great Britain. In 1910, official calorific tests became obligatory on the Gas Light & Coke Company's supply, and later on the other two London Gas Companies' supplies. In 1915 the Gas Light & Coke Company ceased to be subject to tests of illuminating power, and for that Company the calorimeter officially superseded the photometer. This change was warmly welcomed by Prof. Boys, who had been profoundly dissatisfied with the vagaries of photometric gas tests due to differences in the composition of the gas and the burners used.

In 1921 the duties of the Gas Referees were extended from merely the three London companies to the whole of the statutory gas undertakings in Great Britain, and an over-sanguine legislature required a continuously recording calorimeter to be used in tests of the gas supplied by all undertakings selling over 100 million cu.ft. per annum. This requirement appealed very greatly to the inventive ingenuity and fine mechanical skill of Prof. Boys, and ultimately he produced an instrument which became available for official tests as an alternative to one or other of two other designs. His non-recording gas calorimeter, however, remained as the greatest contribution of Prof. Boys to the Gas Industry.

In other spheres Prof. Boys attained the highest distinctions. His early publications, when he was demonstrator in physics at the Royal College of Science, were mostly read before the Physical Society and published in the *Philosophical Magazine*. He became Secretary to the Physical Society, and in 1917–18 its President. He was elected a Fellow of the Royal Society at the early age of 33, in 1888, and later that Society awarded him its Romford and one of its Royal medals. He was made an Honorary LL.D. of the University of Edinburgh, and in 1935 received a Knighthood. He was given scientific distinctions in France, the United States and Russia. His classic work on "Soap Bubbles" passed through many English editions, and was translated into several languages.

Shortly after he was appointed one of the Gas Referees in 1897, Prof. Boys resigned his Assistant Professorship at the Royal College of Science. He had found that Counsel practising at the Chancery Bar constantly wished to have his assistance as an expert exponent of the differences in various patent specifications which covered mechanical or other physical subjects. He became well known for many years to the Chancery Judges as a lucid witness who was scrupulously fair to both litigants.

Incidentally he was one of the few persons who, in the early eighties, mastered the "Otto" bicycle (invented by a brother of the inventor of the Otto gas-engine), and rode it up and down hill and dale. It may be described as a tricycle in which the small wheel was omitted, so that the rider's balance was fore and aft instead of sideways. I well remember meeting a few "Ottos" on the road when I was riding one of the "penny-farthing" bicycles, which I learnt to ride as a schoolboy in 1881.

Sir Charles V. Boys was an admirable colleague and collaborator, and throughout the period October, 1917, to March, 1936, when he had Dr. J. S. Haldane and myself as his fellow Gas Referees, the greatest harmony and concord prevailed in all their proceedings. Sir Charles, like most scientific men, became absorbed in the scientific problem or invention which he had in hand at the moment, and did not then suffer gladly those who were incapable of appreciating mechanical and physical triumphs. When such problems were not predominant in his mind he was socially a most charming companion, with a grand sense of fun and humour.

His death on the 30th of last month leaves a very great gap for those who knew him well, and a smaller, though very real, gap for those who knew him only by his achievements.

Letters to the Editor

Coal Conservation

DEAR SIR,—When Mr. J. G. Bennett addressed the Fuel Luncheon Club on Feb. 18, he stated that, if challenged, his figures could be verified. It is now clear from his letter in your issue of April 5 that he failed to verify them. For example, in his speech he gave the tar figure as 4%. He now admits that it should be 7%, which shows an error of over 40% in his original estimate. He also shows that his gas and coke figures were incorrect.

He devotes the greater part of his letter to demonstrating that the average efficiency of the gas-making process does not exceed 65%, but it should be noted that his calculations are all based upon assumptions. He has assumed calorific values for coal, coke, gas, and tar. The sub-heading of his table is misleading; it should have read: "Based on 1937 Board of Trade Statistics, and on *Assumed* Data for Calorific Values." It is possible to arrive at all sorts of efficiency figures so long as we work upon assumptions of our own choice.

Mr. Bennett, however, attempts the impossible, because the correct data from which we could work out the heat balance is not available. It is available only in respect of individual works.

When contrasting efficiencies he selected the highest figure obtained by Dr. Margaret Fishenden under test conditions. Her figures were 18 to 24, so Mr. Bennett took the latter. He then went on to show what could be expected from the new B.C.U.R.A. fire, again under laboratory conditions. It would have been only fair if he had compared like with like, and taken the efficiency figure of the gas-making process as attained on a well-run plant. Hence, he might well have referred to a Paper by Mr. Thomas Hardie (*Journ. Inst. Fuel*, vol. 1, 1926). This Paper contains results "obtained in everyday working" with horizontal retorts and continuous vertical retorts. The commercial efficiency of horizontals was 78.4%, without waste-heat recovery. Waste-heat recovery would increase the figure by 4 points. The commercial efficiency of the continuous vertical process was 85.6%.

If he will refer to that Paper he will find that Hardie gave a value of 1.85 therms per gallon for the horizontal tar, and 1.818 therms per gallon for vertical tar. Mr. Bennett, for some reason best known to himself, has taken the value as 1.5 therms per gallon, instead of 1.835, a mean of the above figures given by Hardie. Again, we can compare Mr. Bennett's assumed calorific value of 11,500 B.Th.U. for coke with Hardie's figures of 12,284 and 12,242 respectively (coke and breeze together). We see, therefore, that Mr. Bennett's tar and coke values are very much on the low side, and for that reason his thermal efficiency figure is too low, and cannot be accepted.

He takes the calorific value of the coal from certain survey records, but instead of taking the calorific value of the coke obtained *from the same coal*, which is what he should do, he takes nine samples of coke at random.

In 1942 (*Journ. Inst. Fuel*, Feb., 1942, p. 82) he took the calorific value of coke as 12,000 B.Th.U./lb., and that of tar as 16,200 B.Th.U./lb. The latter figure works out at about 1.88 therms per gall. He was then, as now, working on 1937 figures, so what are we to make of his new heat balance? Again, he takes the figure of gas *sold*, whereas he should have taken the quantity of gas *made*—a higher figure.

Compare his approach to gas with his claim of 45% efficiency for the new fire. How does he get the figure of 45%? The method was disclosed in a Paper which he read in February, 1942 (*Journ. Inst. Fuel*, Feb., 1942, p. 89). These were his words: "I think we should be able to get coal fires without waste heat recovery which will have an overall thermal efficiency of 40%, made up as to 35% direct heating of the room in which they are situated and 5% *work of necessary ventilation*." The italics are mine. With waste-heat recovery he brought the figure up to 55%. B.C.U.R.A. is the only body, as far as I am aware, which has proposed to add the chimney losses to the efficiency of an open fire. If we resort to this practice, we must add it also to a coke fire and a gas fire, and also revise our practice in regard to boiler efficiency trials.

Finally, I fail to see the point of his final paragraph. Whether he endorses Lord Brabazon's warning or not has nothing to do with the efficiency of the carbonization process, which is the matter in dispute.

Oakfield, The Park, Yours faithfully,
Cheltenham. JOHN ROBERTS.
April 3, 1944.

Gas-Fired Hot Water Supply for Industry

DEAR SIR,—I have read the comments of Mr. Arnold J. Leather on the table prepared by Dr. Oscar Faber which I quoted in my Paper, "Gas-Fired Hot-water Supply for Industry," and although as a heating engineer I do not claim complete knowledge of gas and coke production, I think I am right in assuming that Dr. Oscar Faber claimed that 76% was the total heat available in all the products obtained from one ton of coal in making gas, coke, creosote, tar, &c.

If this is so—and Mr. Leather's own figures tend to prove this, as he quoted 44.4% of the heat available in the coke, and 28.5% in the gas, a total of 72.9% in these two products alone—then surely the original figures are correct inasmuch as gas is not produced without making coke and *vice-versa*.

To justify Mr. Leather's calculations of only 28.5% heat available from one ton of coal when producing gas, all the coke and other products obtained from this same ton of coal would not have to be usable.

To take the total overall heat efficiency of a gas-works for all fuels is, therefore, correct, as I know of no normal gas-works where gas is produced without the manufacture of a smokeless fuel and other by-products whose heat content is usefully employed.

Thomas Potterton (Heating Engineers), Ltd.,
Cavendish Works, Yours faithfully,
20–30, *Buckhold Road,* E. G. BROOKS.
Wandsworth, S.W. 18.
April 3, 1944.

Technical Education for Industry

Mr. Butler, President of the Board of Education, announced in a Parliamentary written answer on April 5 the terms of reference and members of a Departmental Committee to report on future collaboration between universities and technical colleges on higher technological education in relation to the needs of industry. The Chairman will be Lord Eustace Percy.

The terms of reference of the Committee are: "Having regard to the requirements of industry, to consider the needs of higher technological education in England and Wales and the respective contributions to be made thereto by universities and technical colleges, and to make recommendations, among other things, as to the means for maintaining appropriate collaboration between universities and technical colleges in this field."

The members will be: Dr. D. S. Anderson, Sir Lawrence Bragg, Mr. W. H. S. Chance, Sir Charles Darwin, Dr. E. V. Evans, Mr. Mouat Jones, Mr. S. C. Laws, Dr. H. Lowery, Mr. H. S. Magnay, Sir George Nelson, Mr. J. F. Rees, Dr. R. V. Southwell, Mr. H. Fitzherbert Wright, with Mr. Maxwell-Hyslop, Board of Education, as Secretary. Officers of the Board will attend meetings of the Committee as assessors.

Price of Coke Oven Gas

Writing to the *Sheffield Telegraph* recently Mr. E. L. Ford (Managing Director) and Mr. G.W. J. Bradley (Director and Coke Oven Manager), of the Grassmoor Company, Ltd., referred to the speech of Lieut.-Col. Sir Henry Stephenson at the annual meeting of the Sheffield and District Gas Company. In the course of their letter they said: "This Company [*i.e.*, the Sheffield Company] buys and distributes enormous quantities of gas made in bulk by a large group of coke oven plants, and prior to the war made little or no gas itself. Sir Henry points out that the demand for this gas now exceeds the supply, and that in consequence his Company has had to manufacture in order to meet requirements of consumers. You will note that he stresses the fact that this home-made gas costs considerably more than is paid for the bulk supply. Very naïvely, Sir Henry goes on to say: 'It is to be hoped, therefore, that when, or even before that happy time arrives, some arrangement will be possible to ensure that adequate supplies of coke oven gas at a *reasonable* price will be available, and it is perhaps not out of place to remind you that until we constructed the South Yorkshire grid, this gas was being wasted in the air.' . . . The experience of the last fifteen years or so has shown that the coking industry has not had a sufficient margin of profit to make adequate provision for maintaining its plant, let alone expand it, and the shortage in this respect is due to the uneconomic price realized for gas. . . . Unless due attention is given to this, the gap between supply and demand may well become much wider. Though our Company does not supply to the Sheffield gas grid, we are interested in another area. The price of bulk gas is, however, a national problem, and we feel that the true position should be ventilated."

In the course of a reply, Sir Henry Stephenson observed: "As regards the price paid for coke oven gas, I made it abundantly clear that we did not object to these prices being advanced in relation to increases in the price of coal. Provision for such increases is made in our 1931 Act of Parliament and they are paid automatically. My objection was to two unauthorized advances more or less forced upon us, which for the sake of euphony I termed *ex gratia* in the absence of any adequate explanation of their necessity."

In a further letter Messrs. Ford and Bradley maintained that "the present prices of coke oven gas are totally inadequate and that the whole of our industry is greatly concerned. . . . The prices now ruling in the coking industry are all out of line, and we consider that as a first step the question of gas prices should be studied *de novo*. It may not be realized that the gas output of a coke oven plant represents 15 to 25% of its total tonnage throughout, and if this tonnage does not command a satisfactory price, no amount of reference to past history and opinion will ensure adequate supplies."

On **March 23** Messrs. Alder & Mackay, Ltd., were honoured by a visit from H.R.H. the Duchess of Kent to their New Grange Works, Edinburgh. Her Royal Highness was received by the Chairman, Mr. J. Miller Thomson, and Mrs. W. Grant, from whom she accepted a bouquet. Mr. Thomson presented Messrs. J. O. Scott, Stanley Bennet, Joe Bennet, and A. M. Grant, Directors of the Company, and Mr. Wilkins, Works Manager, and there followed a short tour round the machine shops, where Her Royal Highness showed a lively interest in the various operations and spoke to many of the female employees engaged on them. Her Royal Highness was attended by Lord Herbert, Lady Rachel Davidson, and Bailie Banks, Senior Bailie of the City of Edinburgh.

Midland Counties Coke Association

The Sixth Annual General Meeting of the Midland Counties Coke Association was held at King Edward House, New Street, Birmingham, on March 30, Mr. A. W. Smith, C.B.E., Birmingham Gas Department, in the Chair.

During the course of his account of the year's working, Mr. Smith dealt at some length with the important subject of coke prices and merchants' margins, the latter having come into prominence during the summer of 1943 owing to the desire of the Ministry of Fuel and Power to substitute coke for coal in the domestic market.

Dealing with supplies of coke, he said there had been a sudden change in the position towards the end of the year under review, and members were now faced with an extremely heavy demand for coke. This had led to a certain measure of "direction" of supplies by the Ministry of Fuel and Power—a delicate matter which was, however, being carried out as judiciously as the difficult circumstances allowed.

The subject of the technical and commercial development of coke, said Mr. Smith, was one which was very much in mind at the present time. The London and Counties Coke Association had been in advance of the rest of the country in this respect, and for some years had had a first-class Technical Department with, before the war, a good-sized staff, each an expert in his own particular subject—coke-burning appliances, heating and ventilating engineering, steam-raising, agriculture, &c.—and they had a remarkable record of achievement. No such work has as yet been undertaken collectively by the Gas Coke Industry in the rest of the country, but the Midland Association had realized some time ago that this aspect of its work must be given serious consideration and that it must be tackled now, not left until after the war, if they were to reap the full harvest of their efforts. He had proposed at a meeting of the General Committee of the National Federation of Gas Coke Associations early in 1943 that a full report should be made on the subject. This had been done, and the Report on Future Coke Development had been circulated to the District Associations, and since then to individual members of the Midland Counties Coke Association.

Mr. Smith said: "The Report is intended to cover every aspect of the work which should be undertaken by Coke Associations, individually and collectively, and was designed for all districts, including those which had not yet set up a working organization. Let us see where we, the Midland Association, stand in relation to the recommendations summed up at the end of the Report.

"Of those which apply to District Associations, we can congratulate ourselves upon having already accomplished a number of them. We have an active Association, with an agreement of five years' duration; we have a Distributors' Branch; we have a good working arrangement with the Hard Coke Producers; and we had achieved, before the war started, the most difficult piece of work of all, and that was the construction of a price schedule. If there had been no war, and price-fixing meetings could have continued with the Distributors, there is no doubt that some of those prices would have been altered, and the schedules gradually moulded into something nearer the ideal. That would have been the natural development, which was stopped by the war, but we can never be too grateful that we had something in print, and were not faced with the necessity of getting down to that particular job after the war had started.

"It is when we get to the recommendations on the technical side that we get on to ground which we have not yet covered. Our Constitution states that one of the aims of the Association is 'to provide certain services in regard to technical research and information and publicity.' Up to the present we have confined ourselves to the arrangement made early in 1939 with the London and Counties Coke Association whereby all our members receive technical reports and such information as can be supplied by correspondence; this has been good value and very much appreciated, but now we have to go farther. The Report on Future Development recommends that each District Coke Association should set up a Technical Committee and, if possible, appoint at least one Technical Assistant as a permanent full-time official; and that a National Technical Committee should be formed, and plans made for other technical development as suggested in detail in the Report.

"A National Technical Committee has already been established, and Mr. T. F. E. Rhead, Chief Chemist at Birmingham, and Mr. A. E. West, Deputy Engineer at Coventry, have been appointed as this Association's representatives. The first meeting, held in London on Feb. 17, was from all accounts an extremely enthusiastic and promising one."

Mr. Smith went on to say that Part 2 of The Institution of Gas Engineers' Report on Coke Quality would shortly be issued, and he understood it would propose that the National Federation of Gas Coke Associations should be asked to take certain definite steps towards coke development and to collaborate with the Coke Oven Industry and the Gas Research Board. There had been for some years a Tri-partite Technical Committee representative of gas coke, hard coke, and anthracite producers, which was now part of the recently formed Solid Smokeless Fuels Federation. This was the basis for collaboration between producers of solid smokeless fuels, but now for the first time gas coke technical work would be centralized nationally.

"All members of the new National Technical Committee," said Mr. Smith, "were agreed that there were wide fields for commercial and technical development throughout the country, and taking the Report on Future Coke Development as their basis they had recommended that a Technical Committee should be set up in each District Coke Association's area as soon as possible. It was recognized that during the war it might be difficult for the District Coke Associations to employ the technical staff recommended in that Report, and that during the war period technical development might have to be confined to that which could be done by the Technical Committee. The National Technical Committee had also recommended that Mr. Boon, General Manager of the L.C.C.A., should be asked to prepare a history of the way in which the London & Counties Coke Association had developed its technical work from the commencement, and a summary of the material which was already available for use in other Districts for the benefit of the technical representatives of the District Coke Associations."

Mr. Smith said this was a development which had to take place; the Central Committee had discussed the matter at a meeting earlier in the afternoon and recommended that a Technical Committee should be set up by this Association, its composition to be left for the time being for further consideration.

"There is one recommendation contained in the Report on Future Development," he said, "which I should like to repeat, as it is the keystone on which all the rest will stand or fall. It is this: 'Each District Coke Association should pursue an active coke policy and should persuade every constituent member to do likewise, by giving to coke a place in their sales development plans proportionate to the revenue which it produces.'

"Any work carried out by the Solid Smokeless Fuels Federation, by the National Technical Committee, or by our own Technical Committee, will be worthless if it is not backed up individually by each constituent member. Although we may not be able to make very great changes until the war ends, at least we can put our house in order now, and have our plans all ready for the return of normal trading conditions, because there is no doubt that our competitors are making themselves ready to leave the starting-post as soon as the word is given.

"Quality and sizing are the first considerations. Quality we cannot control at present, but it is a hopeful sign that some of our members who have not sized their coke in the past are now taking steps to install plant for this purpose, and I must warn those who have not done so that there is every likelihood, when the schedules are revised, that the basic price will be for screened and graded coke, with a possible reduction for No. 1 size coke, but with no reductions for unscreened coke such as are shown at some places in the present schedules. This would mean that ungraded coke would no longer have any price protection from graded coke which might come into the town. If we are to have the real interests of gas coke at heart we must fight against inferior material being put on the market, and there is no reason why this should not be achieved if we can count upon a spirit of realism and progress in every undertaking."

He then moved the adoption of the Report and Accounts for 1943.

Mr. F. C. Briggs (Dudley), in seconding the adoption of the Report and Accounts, touched upon the history of the merchants' margins problem, and the progress being made by the Merchants' Margins Sub-Committee. The Sub-Committee's report was at present in draft, for consideration by the full Joint Committee of Gas Coke Producers, Hard Coke Producers, and Distributors. If agreed by that Committee and by its constituent bodies the scheme would finally have to be sanctioned by the Ministry of Fuel and Power. History would definitely have been made if agreement were achieved.

Mr. T. F. E. Rhead (Birmingham) gave an outline of coke investigations by the various Committees. He pointed out that the Sir Frederick West Committee had reported on the need for screening coke, which had been accepted by the Industry, and in a second Report (at present in the press) on the need for research into coke quality. Arising from this a Joint Committee had been formed between the Gas Research Board and the Technical Committee of the Solid Smokeless Fuels Federation, which had drawn up a series of recommendations for further research, upon which Mr. Rhead commented briefly. He felt that a little more consideration should be given to the setting up of a District Technical Committee, though it should be done as soon as possible. However, as would be seen from the above remarks, research work would not be held up in any way.

Mr. Smith said that the adoption of the Annual Report and Accounts would cover various points discussed that afternoon, including the decision to set up a District Technical Committee.

The Report and Accounts were thereupon unanimously adopted, with expressions of thanks to the Secretary and staff, and the meeting closed with a hearty vote of thanks to the Chairman.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Oils and Chemicals From Coal*

By Dr. A. PARKER, F.I.C., M.I.Chem.E.,
Director of Fuel Research

(*Concluded from p. 441*)

The main credit for solving the problems associated with the large-scale hydrogenation of bituminous coal undoubtedly goes to Imperial Chemical Industries, Ltd., whose plant was brought into full-scale operation in 1935, with an annual output in the region of 150,000 tons of petrol. The actual output in 1938 was 140,000 tons, or just over 42 million gallons, that is, not far short of the total production of light spirit from coal carbonization. It is understood that in recent years creosote has been to an increasing extent employed as raw material, thus creating a brisk market for this commodity.

Over 60% of the coal can be converted to petrol, but the overall consumption of coal is 3½–4 tons per ton of petrol, and the thermal efficiency is of the order of 40%.

Certain chemical by-products arise from the process. Thus the sulphur and nitrogen of the coal are converted to hydrogen sulphide and ammonia respectively, and the hydrocarbon gases, methane, ethane, propane, and butane (which represent 20–25% of the weight of the coal treated), could be utilized as raw material for chemical syntheses as an alternative to using them for conversion to hydrogen for the main process, which is the normal practice.

Phenol, the cresols, and higher phenols can be recovered from the initial products of coal hydrogenation in amounts up to 10 times those obtained by coal carbonization, and higher aromatic hydrocarbons can be prepared by a simple process of dehydrogenation of selected fractions of the liquid product. It seems fairly clear that the various stages of coal hydrogenation provide a rich source of chemical products, and it may well be that future demands for raw materials for the plastics and other chemical industries will lead to a complete change in the primary object of the process.

The cost of the process up to the present has made its economic utilization dependent on the continuation of the tax on imported hydrocarbon oils, and though this dependence may mitigate against its widespread development in the near future, I cannot stress too strongly the importance of continuing such large-scale work as that of Imperial Chemical Industries, Ltd.

Hydrocarbon Synthesis

The other great oil-from-coal process is that usually associated with the names of its German originators, Franz Fischer and Hans Tropsch, who in 1926 published an account of the production of liquid and solid aliphatic hydrocarbons from water gas at atmospheric pressure. As in the case of hydrogenation, when the possibilities of the process were realized, large-scale development passed into the hands of German industry, and the first full-scale plant was erected by Ruhrchemie A.G. in 1936. Development was rapid, and at the end of 1939, nine plants with a combined annual output of 500,000–600,000 tons were stated to be in operation. In 1940 the annual output of oil by this process in Germany was estimated at about 1 million tons—that is, rather less than half the output of their hydrogenation plants. Since the early work of Fischer and Tropsch considerable advances have been made in the technique of the original atmospheric-pressure process, and in 1939 Fischer and Pichler described a so-called medium-pressure process employing similar raw material and catalysts, but using pressures in the range 5–15 atmospheres. Under these conditions it is claimed that higher yields of solid and liquid hydrocarbons are obtained, and that the life of the catalyst is prolonged. Last year (1943) Fischer indicated the existence of other variants of the basic process, including higher pressure, and claimed that by their employment, branched-chain hydrocarbons (in contrast to the predominantly straight-chain hydrocarbons made in the basic process), and aromatic and naphthenic hydrocarbons could be produced. It is probable that only the normal-pressure and medium-pressure processes using cobalt or iron catalysts are in use on the commercial scale at the present time.

There has so far been no full-scale commercial development of the process in this country, but since 1934 the process and its products have been studied at the Fuel Research Station on the laboratory-scale and on a semi-technical scale, and much valuable information has been collected which should lead to improvements in the process as operated in Germany before the war.

The raw material for the normal process is a mixture of carbon monoxide and hydrogen in the proportions of 1 to 2. There are many ways of preparing such a mixture, and all I wish to say is that processes are available for its production from coke alone, from coke and coke-oven gas, from coke-oven gas alone, or from coal by complete gasification. The process selected in a particular case will depend to a great extent on the location of the plant, and on whether it is to be operated in conjunction with or independently of coke-oven plants or other carbonizing projects. The synthesis gas must be purified down to a total sulphur content of less than 0.1 gr./100 cu.ft., and is then passed, with or without compression, to the reaction chambers containing the catalyst granules. These chambers are somewhat complicated in design owing to the necessity for rigid temperature control. The temperatureis usually in the range 180°–200°C.

The primary products consist of condensible C_3 and C_4 gases, a petrol fraction, a diesel oil fraction, and wax. The gases can be liquefied and sold for use as a portable gaseous fuel. The diesel oil is of very high quality and, as I have already indicated, is used to the best advantage in blends with inferior tar oils; the wax is of value in the manufacture of polishes, electrical insulating materials, &c. The petrol fraction, however, has too low an octane number for direct use in modern petrol engines.

About 70% of the carbon monoxide used is converted into primary products, and to produce 1 ton of these products a total of at least 3½ to 4 tons of coal is required. The thermal efficiency is thus of the same order as that of coal hydrogenation.

Apart from the diesel oil fraction, the initial products are best utilized as raw material for conversion to secondary products. Thus, by the application of modern petroleum refining processes of cracking, catalytic reforming, alkylation, isomerization, and aromatization to the whole product, including the C_3 and C_4 gases, the Germans claim to be able to obtain high yields of aviation fuel.

From the olefines present in the primary products or produced from them by thermal cracking, satisfactory lubricating oils can be produced, and certain oils of this type prepared at the Fuel Research Station have been proved to be of very high quality.

Liquid-phase oxidation of the low-melting fractions of the wax gives rise to fatty acids similar to those of the natural fats, and it has been shown in our work at the Fuel Research Station that a 50% yield of acids in the range suitable for soap manufacture can be produced in this way. This process is believed to be in operation on a considerable scale in Germany for soap manufacture. Though it has been claimed that the products can be converted into edible fats, there is as yet no evidence that such use is being made of them.

In recent years a new chemical industry has grown up in America based on petroleum, and particularly on the gaseous by-products of petroleum refining. A whole range of solvents, plasticizers, and starting materials for the manufacture of synthetic rubbers, resins, and fibres is being obtained in this way, and many more products could be produced if the demand arose. When we consider that the products of hydrocarbon synthesis may be regarded as a kind of synthetic petroleum (actually much less complex in composition and more amenable to cracking than most natural petroleum), it is clear that most of these products could equally well be obtained from coal *via* the Fischer-Tropsch process, though not so cheaply. Thus, just as coal carbonization provides the foundation of the aromatic chemical industry, so could the synthesis process be made the basis of a vast aliphatic chemical industry.

At the present time the synthesis process is costly to establish and operate, as in the case of coal hydrogenation, but this may not always be the case, and the erection of a plant in this country of sufficient size to provide first-hand technical and economic information is long overdue.

Methanol

In recent years the publicity given to the process I have just been discussing has rather tended to obscure an earlier method of obtaining chemicals from coal—namely, the synthesis of methyl alcohol from carbon monoxide and hydrogen. This process was developed about 20 years ago, partly in France and partly in Germany. It consists, briefly, of passing a purified mixture of carbon monoxide and hydrogen, in the same proportions as are used in the Fischer-Tropsch process, over a mixed oxide catalyst at a temperature of 350°–400°C. and at a pressure of about 200 atmospheres. The plant of Imperial Chemical Industries has an annual capacity of about 6 million gallons, but in 1938 the total production of methanol in this country was only about 3½ million gallons.

By slight modification in the process conditions and nature of the catalyst an appreciable proportion of mixed higher alcohols can be obtained—a process which has been exploited to some extent by the Du Pont Company of America. The synthesis of individual alcohols by this process suffers from a similar limitation to that of individual hydrocarbons by the Fischer-Tropsch process. In neither process has it so far been found possible to make as the main product any member of the series other than the lowest; in other words, we are at present limited to the production of methane alone or a complex mixture of aliphatic hydrocarbons, and to methyl alcohol alone or a whole range of alcohols.

The use of methyl alcohol as a constituent of motor fuels has frequently been advocated, and schemes have been devised for an expansion of its production to this end. It seems, however, that in this country methyl alcohol has been mainly absorbed by the chemical industry. Two of its most important modern uses are in the manufacture of the methyl methacrylate plastics, of which "Perspex" is a well-known example, and as the main source of formaldehyde, which is required in large quantities in the bakelite-plastics industry.

Although it has not yet been achieved, it is theoretically possible to produce formaldehyde direct from carbon monoxide and hydrogen —a process which would greatly simplify the production of this valuable agent from coal.

* From a Paper to the North Staffordshire Fuel Society.

Acetylene

Yet another vast chemical industry has been built up in comparatively recent years based on acetylene derived mainly from calcium carbide and hence, therefore, from coal. Acetylene is the raw material for the manufacture of acetyldehyde, acetic anhydride, and acetic acid, which are required in large quantities in the manufacture of synthetic fibres such as rayon, and it is the basis of the synthetic rubbers Neoprene and Buna N and the acrylate series of plastics.

Before the war all acetylene used in this country was made from imported calcium carbide, not through lack of indigenous raw materials (coke or anthracite and limestone), but largely because of the large amount of electric power required (3500 kw. hr./ton of calcium carbide). Economic production of carbide is dependent on a supply of cheap electricity.

The Future of Gas Lighting*

By D. M. THOMPSON, Assoc.M.C.T.

COMPETITION in the lighting field will certainly be fiercer after the war, and whether we are able to compete successfully depends on the skill and energy we put into the job. I am an optimist concerning the future of gas lighting, although I realize the difficulties against which we must contend, but I also appreciate our advantages, and I consider that the gas-lighting load can be retained and increased. People will want more light than ever when the blackout ends.

There seems to be a feeling, even within the Gas Industry, that gas lighting is a thing of the past. Why should this be so? It is based mainly on the facts that electricity is more adaptable for lighting, and there are now electric light sources of greater efficiency than hitherto. This feeling, in part, is also due to the fact that insufficient attention has been paid to lighting by the Gas Industry, but technically gas provides an excellent form of illumination with advantages of its own, and for some uses it is unexcelled. Economically we can compete, and the lighting load is a very valuable one to the Industry.

It is practically impossible to arrive at a figure for the total lighting load, but the pre-war consumption for street lighting alone was 15,000 million cu.ft. per year and was increasing year by year. In many undertakings the street lighting load was about 10% of the total output. At Burnley street lighting was 11.1%, mill lighting 2.5%, outside shop lighting 0.25%, and in addition there are approximately 10,000 houses with gas lighting. We can assume that, with other industrial and commercial lighting, the total lighting load must have been about 20%, or 200 million cu.ft. per year. These facts show clearly that gas lighting is not dead, and I hope to show reasons why it should remain very much alive.

It is quite possible that the expert chemist and physicist may yet discover some new type of gas lighting source of greater efficiency than the gas mantle. There is scope for such an improvement, since the thermal efficiency of a gas light in terms of light output is very low, being only about 0.2%. If, when such an improvement has been discovered, we have allowed gas lighting to lapse, then we shall be in a poor position to take advantage of the new development.

In any case, we should do our best to maintain present lighting at its peak, since poor lighting is a bad advertisement for gas generally and a poor light reflects on our other activities.

The maintenance of light output is excellent. I have tested mantles over a period of 2,000 hours and the reduction in light output was only 6.7%. Even when taking all factors into account, the light output can be maintained to within 20% to 25% of the initial value if the maintenance is good. Reliability is a strong point. Multiple mantle burners ensure almost complete freedom from total failure, and this is of particular benefit for street lighting and the lighting of traffic danger lamps. The use of gas for emergency lighting has given us a good reputation for reliability in the eyes of the public.

Radiant heat from a gas light is about 30% of the heat input, and it provides a useful form of background warmth. The heat in the waste products also assists heating. In cases where this extra heating is not desired or the waste products are a particular nuisance, ventilated fittings can be used, and I consider that not enough attention has been paid to this class of fitting. Something simpler and cheaper than the present fittings is required, which could even be used for domestic lighting. Trouble due to waste products would be greatly decreased if organic sulphur removal was practised, and the benefits would certainly not be confined to the lighting field. The hissing noise is a slight disadvantage for domestic, shop or office lighting, but improved burner design will reduce the trouble. In any case I have never heard of anyone giving up gas lighting merely because of noise.

We are in danger of being "talked out" of lighting by taking all the electrical sales talk at its face value and thinking too much of our own advantages. Electricity has some disadvantages of its own which we tend to forget. For example, there is the high intrinsic brilliance of filament lamps, and when diffusing globes are used to obviate this effect then some of the light is absorbed by the globe. Discharge lamps, mercury and sodium, suffer from the fact that the light is monochromatic—that is to say, the colour is confined to one narrow band of the spectrum and is not mixed as is daylight and other forms of artificial light, therefore it only shows correctly that particular colour and the rendering of other colours is distorted. While the colour of mercury lighting can be improved, it is unlikely that there will be any change in the colour of sodium light. Again there is the stroboscopic effect of discharge lamps, which has the effect of making moving parts appear stationary and renders these lamps unsuitable for some industrial purposes.

The cost of both discharge and fluorescent lamps is high, and one need only consider the construction of a 5-ft. fluorescent tube to realize that the price is never likely to come down to the level of a filament lamp. The depreciation of light output of both fluorescent and discharge lamps is fairly high, higher than for filament lamps, which in turn have a greater depreciation rate than gas mantles.

Electric light sources commonly emit almost half their total light output in the upper hemisphere, while for gas-light sources 85% to 90% is initially distributed in the lower hemisphere; thus for an electric lamp more light must be redirected downwards, with a consequent greater loss due to absorption by the reflectors, &c.

It is very difficult to arrive at comparative costs for gas and electric lighting, since so many factors must be taken into account; for example: (1) Relative charges for gas and electricity; (2) cost of installation; (3) cost of renewals; (4) cost of maintenance; (5) depreciation of light output; (6) relative lighting efficiencies; (7) absorption of light by reflectors.

Generally each case must be considered on its merits, but I give comparative figures in Table I based on the total lumens of the bare light source.

TABLE I.—COMPARATIVE EFFICIENCIES FOR GAS AND ELECTRIC LAMPS OF TYPICAL INDOOR TYPES BASED ON THE AVERAGE LIGHT OUTPUT OF THE BARE SOURCE.

Type of electric lamp	60 watt G.F. filament coiled coil.	200 watt G.F. filament.	80 watt fluorescent tube.
Current consumption, including losses in chokes, &c.—watts	60	200	92
Initial lumens of bare source... ...	700	2,880	2,800
Average lumens during life (initial less lamp and dirt depreciation) ...	595	2450	2100
Life of lamp (hours)	1,000	1,000	2,000
Price of lamp, each	1s. 7d.	5s. 6d.	30s.
Corresponding gas lamp	2 lt. No. 1	5 lt. No. 2	4 lt. No. 2
Consumption (B.Th.U./hour) ...	1,750	6,250	5,250
Initial lumens of bare source... ...	805	2,870	2,420
Average lumens during life (initial less dirt and mantle depreciation) ...	705	2,550	2,120
Life of mantles (hours)—say	1,000	1,000	1,000
Price per mantle	4¾d.	4¾d.	4¾d.

Prices of lamps and mantles are present-day prices without purchase tax.

What are the prospects for gas lighting in the future? This question is easier to answer if we consider the various types of lighting separately, and I propose to divide them into the following categories: (1) Domestic; (2) commercial (shop, office and warehouse); (3) industrial; (4) street lighting; (5) miscellaneous lighting.

Domestic and Commercial Lighting.—There are a great many houses, shops, and offices where gas lighting is used and, though electricity will exert a powerful influence in the future on the grounds of convenience and decorative effect, we should do our best to retain the present load. Gas can show a big saving at ordinary lighting rates over filament lighting, which is the most likely competitor in this field, and this is an important point among the lower income groups. Particular attention should be paid to shoplighting. Full advantage should be taken of switch control and automatic ignition. Simple ventilated fittings would be of great use in this sphere. Technically my ideal installation of this type would have a service governor, fixed gas nipples, and, if possible, fixed air.

One type of commercial lighting which should be encouraged is outside shop lighting; but if this is to be a success new lamps of neater appearance are needed.

Industrial Lighting.—The illumination requirements for factory lighting are now regulated by the 4th and 5th reports of the Home Office Departmental Committee on Factory Lighting. Shortly before the war the Fourth Report was issued, and it recommended a minimum illumination in working areas of 1 ft.-candle at floor level without prejudice to any additional illumination required for the work itself; other than working areas to be not less than 0.5 ft.-candle, and open yards, &c., to be not less than 0.1 ft.-candle. Other recommendations controlled the cut-off angle of reflectors in order to obviate glare. Then came the war and the production drive, and a Fifth Report of the Committee made new recommendations for war factories which raise the standard required to 6 ft.-candles in a plane 3 ft. from floor level.

* From a Paper to the Manchester and District Junior Gas Association.

I think it is very probable that after the war the higher figure will be embodied in the Factory Regulations, and we must be prepared to cater for this as an absolute minimum. It is interesting to note that, because of the change from floor level to a plane 3 ft. high as the point of measurement, the new recommendations do not mean a six times increase in illumination. In fact the ratio of increase varies with the mounting height: with lamps at 7 ft. mounting height the increase is double at a point directly under the lamp, but with lamps at 16 ft. mounting height the increase in only $1\frac{1}{2}$ times. I consider that industrial lighting holds good prospects for gas, as the adoption of these standards opens up a fruitful field for increase, since many existing installations are inadequate.

Gas lighting is suitable for most factory lighting; the heat can be a definite advantage by supplementing the works heating and preventing cold down-draughts from a glass roof. We should aim primarily at retaining and improving existing installations and then getting new business. In factories which use large quantities of gas for other heat processes the merits of gas lighting should be stressed, since it should be possible to offer very favourable terms on the same basis as the industrial rate.

On the technical side, attention to the following points will effect improvements:

(1) The installation pipes must be adequate to ensure even pressure conditions.

(2) Constant pressure governors to be used on the supply to the lighting system.

(3) Burners to be fitted with fixed gas nipples. In connexion with the governor, this means that a guaranteed consumption can be maintained and ensures more efficient lighting.

(4) More attention should be paid to pre-mixed systems, especially in dusty or dirty situations.

(5) Where high mounted, high intensity lights are needed, high pressure gas should be considered.

(6) When very high illumination is required local lights can be used.

The Burnley Gas Department has developed a special burner for mill lighting, with some novel features. For example, there is a dust shield over the air inlet to reduce trouble due to fluff and dust, and the fixed nipple is made of steatite, which effectively prevents tampering and broaching out of the nipple. In the Burnley area 82 out of 89 mills, prior to the war, used gas lighting.

In my opinion a range of standardized industrial fittings should be designed and manufactured by agreement between all makers, and standard tables published for their use, similar to those of the Electric Lamp Manufacturers' Association for electric fittings. This would simplify design of installations and mass production should reduce costs.

The best way to demonstrate the merits of gas lighting is to show a good practical installation, so why not make a start in our own workshops so that they become, in effect, an extension of the showrooms?

Street Lighting

This is the most important gas-lighting load, and it is vital that we should retain it. I think it is the load where the biggest advances and increases are possible,

There is no doubt that the general public are eagerly awaiting the time when blackout restrictions are raised. It has taken the blackout to prove just how much street lighting contributed to our daily lives, and its return will be warmly welcomed. I am afraid the man in the street is expecting immediate re-lighting, in many cases on the night the armistice is signed. We know that this is impossible; there are many factors which will slow down the process. It is to be hoped, however, that re-lighting will be as rapid as possible, not only to restore a vital public service, but also because it will have considerable prestige value. Preparations to this end must be made now.

There will be big developments in street lighting after the war, as envisaged in the Ministry of Transport Report, and we must be prepared to play our part in these improvements. Gas street lighting is certainly as good as, and I consider superior to, any other form, provided the installation is correct and adequate.

Post-war competition probably will be similar to pre-war—that is, filament lamps, mercury and sodium discharge, and fluorescent mercury discharge (*i.e.*, colour corrected mercury discharge), though there may be a greater range of lamps available. The true fluorescent lamp, by which I mean the 5 ft. 80-watt fluorescent tube, is not likely to be used for street lighting because of its size, and higher powered lamps of this type would be correspondingly larger. Regarding discharge lighting, I hope that town councils will come to realize that this monochromatic lighting, however modern it may appear, is certainly not suitable for the lighting of town centres, shopping streets, or areas where people congregate for pleasure; its use in holiday resorts seems to me a suicidal policy. There is no inherent advantage in the colour over other types of light; personally I think the reverse is the case, and I think it may have a tiring effect on the eye, and the psychological aspect is certainly important.

There will be a greater tendency after the war for local authorities to appoint public lighting engineers, and this should be of advantage to the Gas Industry, since these men will decide the type of lighting on cost, merit, and suitability, and not prejudice, politics, or the mere idea of something new. Moreover, they will realize the necessity of retaining both gas and electric lighting to provide healthy competition. I do not think some of the very low electric rates for street lighting would remain once gas had been completely ousted. We must be prepared, however, to put forward a sound case and attractive tariffs, bearing in mind that street lighting is usually our biggest single customer.

In recent years there has been rather a change of ideas on the subject of street lighting, and it has been realized that the figure for minimum horizontal illumination does not always form a satisfactory basis for appraising the effectiveness of a street-lighting installation. This point has been brought into particular prominence by investigations into the question of road surface brightness. There are now three main schools of thought on this subject which can be classified as:

(1) High road surface brightness.
(2) Semi cut-off lighting.
(3) Cut-off lighting.

Road surface brightness is not a new phenomenon; almost all street lighting installations possess this property to a greater or lesser degree, but often without its significance being fully realized and without any definite effort being made to achieve the effect. All of the three types of lighting I have mentioned rely on road surface brightness to some extent for their effect, the high road surface brightness type to a very great extent and cut-off lighting to a much smaller degree.

Surface brightness is caused by reflection of light from the road surface, probably specular diffuse reflection, and light rays striking the road at a glancing incidence produce the effect to a greater extent than light falling more normally. Areas of brightness are produced on the road, and if these are examined it will be seen that they are roughly inverted L-shaped, with the horizontal arm of the L rather in front of the lamp position, and the vertical stroke extending almost to the feet of the observer even in the case of lamps up to 400 yards distant. These bright areas are not related to the horizontal illumination and, in fact, the area which usually has the highest illumination (*i.e.*, directly under the lamp) appears as a dark patch. This effect can be observed even with the present "starlights," but the patch is shorter, due to the cut-off at 85°.

By correct positioning of the lamps practically the whole of the road surface can be covered by bright patches, and objects on the road are seen as a dark silhouette against a light background. This effect of silhouette vision must be obtained in all successful street-lighting installations unless a very high illumination intensity (1 or 2 ft.-candles) is used, which, of course, is not economically practicable.

High road surface brightness installations aim at making the greatest possible use of surface brightness, and in the design of the fitting high candle-power intensities are maintained up to the horizontal. Most mercury discharge lighting schemes come into this category. In my opinion this type of installation is rather prone to glare, which detracts from the visibility.

In the case of semi cut-off distribution the maximum intensity of the lamp is at about 75° to 80°, and the intensity is much lower from this angle up to the horizontal, but there is not a complete cut-off below the horizontal. Thus, good road surface brightness is obtained, but glare is reduced, since the more distant sources do not appear as bright. I think this system gives a better effect with lower lumen output than any other.

Cut-off distribution is arranged so that the light source is hidden when viewed from a distance, the fitting being made with a definite cut-off below the horizontal. In this case the lamps must be at considerably closer spacing and the amount of light provided must be adequate. Many of the sodium installations use this system in conjunction with centrally suspended lamps. Installation and maintenance costs will be higher due to closer spacing. A disturbing feature is the recurring flash as one drives under the lamp.

Gas lamps are available to suit all three types of lighting, and although I would not care to give a final opinion, since I have not yet had an opportunity of inspecting a modern gas installation on the cut-off system, I consider that the semi cut-off system is the most generally satisfactory. I have obtained excellent results using Sugg's "London" or similar lamps and directing the maximum beam to strike the ground at about the next lamp position.

Improvement of Lamps

There are some excellent gas street lamps on the market, particularly for main road lighting, but improvements are still required, and it is to be hoped that manufacturers have been able to develop some new designs during the war.

The street lamps of the future should be self-contained units with reflector and/or refractors and, if possible, the controller all built in. The present arrangement of lamps with ball joint, safety chains, controller, governor and lamp, all suspended one above the other, is untidy and wastes height; a more compact design of less weight should be aimed at with the lamp right up to the bracket arm. Maintenance costs for the new lamp designs must be low and cleaning quick and easy. Adjustment of the reflectors must be simple, but once set they must be fixed permanently. Above all, the burner and reflector equipment must be efficient; we cannot afford to waste any light.

A new design of lamp is urgently needed to take the place of the square lantern. There are square lanterns in use which were designed for flat flame burners—in fact, some of the self-same lanterns are

still being used. The square lantern had, of course, been improved, but it stands as a symbol of old-fashioned days, and is not very efficient. Something of more modern and pleasing design is required with greater efficiency. The new lamp should retain the big virtue of the square lantern of low first cost. Up to the present the competition in side road lighting has not been so keen, and this is due in part to the fact that small electric discharge lamps were not fully developed before the war, but this condition is likely to alter, and we must tackle improvements in this field with more urgency.

Regarding the actual method of controlling street lamps, clock controllers are now almost universal, and while automatic controllers are certainly advisable on the grounds of both cost and efficiency, I feel that sufficient attention has not been paid to the alternative of pressure operated controllers.

Since it does not appear that much greater efficiency can be obtained from the present gas-light source, it is important that the fullest possible use should be made of the light available, with minimum absorption in the fitting. Everything possible should be done to reduce capital and maintenance costs. An obvious saving would be made if the period between maintenance visits could be increased, and attention to this point in the lamp design would be very helpful. In any case it should be possible to reduce the frequency of maintenance during the summer. This course could only be adopted if clock controllers with a longer run were employed or pressure operated control was used. The lamp design should be such that a minimum of time is spent on cleaning, &c. The design should also require a minimum of renewal.

Reduced capital costs would be obtained by a more economical design of pole with easier erection.

A Plan for the Future

I would now like to make a few suggestions in regard to the organization of a lighting department, which I consider should help us to retain the lighting load. At the present time we have a unique opportunity for reorganization. Now is the time to initiate a bold policy, and bring the lighting side of the Industry into line with modern needs and developments. In the first place, all lighting should be centralized in one department to include both public and private lighting, with a competent technical man in charge (with an assistant or assistants as required by the size of the department). Such a technician must have a thorough knowledge of illuminating engineering, he must be ingenious, something of a salesman and a little of an artist. A foreman or foremen may be needed, depending on the size of the department, possibly one for private lighting and one for about every 5,000 public lamps.

The domestic and industrial salesmen should help by keeping on the lookout for new business and for unsatisfactory installations in need of improvement, and calling in the lighting technician as required.

A maintenance scheme for domestic, industrial, and commercial lighting is a necessity. The frequency of maintenance visits should be regular, and should be arranged according to the amount of use and the special conditions of each particular installation, and not on a plain rota which provides the same maintenance for any and every installation. A small charge can be made for maintenance, but the amount will depend on the proportion of maintenance already included in the gas charge, bearing in mind that lighting probably requires more maintenance relative to the gas consumed than most other apparatus. The foreman should see that the maintenance is carried out properly, and he should be capable of using a photometer for checking industrial and other lighting, from time to time, to make sure that the efficiency is being maintained.

A lamp attendant can usually maintain a round of 230–250 automatically controlled lamps, but this will vary with local conditions and the height and type of the lamps. With a motor tower wagon we find in Burnley that one man and a driver can manage a round of about 400 main road lamps. The frequency of cleaning, &c., is limited by the run of the clock controllers and, therefore, this is usually once per fortnight. The lamp attendants should do all cleaning, re-mantling, winding, oiling, glazing, adjustment, and any simple repairs and replacements.

After lighting time each man should make an inspection of at least half his round each night and, if possible, of the full round, but in this case it is necessary to make the inspection on a bicycle, and a cycle allowance should be paid. Main road lamps definitely should be inspected every night, and where a motor tower wagon is available this should be utilized for the inspection; by this means the lamps can always be maintained in first class condition, since defective lamps can be attended to immediately. During the inspection any lamps which have failed to light should be lit, and poor lights put right where possible. After the inspection the attendant should make a report showing—

(1) Lamps which fail to light and the reason.

(2) Defective lamps which require the attendance of a maintenance fitter or mains gang.

(3) Defective lamps which he himself will remedy.

Reports of attendance to defective lamps by either the attendant or fitter should show the cause of the defect and the materials used, and thus complete records can be kept and the reasons for defects and failures will be known, and this is a great help when seeking remedies. The foreman should also make nightly inspections, and he should be able to make photometrical tests and be a handy man, capable of carrying out repairs.

Further photometric tests and inspections will, of course, be made by the technical official in charge.

Adequate and efficient inspection is vital to the success of street lighting, since a lamp attendant is a "lone wolf" working on his own, and is not constantly under a foreman's eye. The only real criterion of his efficiency and conscientiousness is the condition of the lamps on his round. Particular attention should be paid to the condition of the reflectors and refractors to ensure that they are in good condition and properly adjusted. Photometric tests are of great importance to make sure that reflectors, &c., are maintaining their efficiency. Mere visual inspection can be very misleading, since the eye only judges by contrast, and if the reflectivity of a whole batch of reflectors has decreased, one is apt not to notice any difference unless the light is down by at least 30%.

Present-day lamps are more complicated than in the past, and we must try to get a better type of man as lamp attendant than was often the case before the war. When the lights go on again, most lighting departments will need many new men, and this will be a unique opportunity to make a fresh start. There are many men who have had experience of technical jobs in the munition industry and in the Forces, and some of these should prove very suitable for our purpose. By making the lamp attendant's job rather more skilled and letting him do more of the maintenance, he should be able to take more pride in his work; we may have to pay a bit more, but in my opinion the results will be well worth the extra cost.

These new men will need training, and this should be properly organized so that they get instruction on both the practical aspect and simple theoretical considerations of all types of street lighting equipment. One or two weeks given up to training will be time well spent.

Metal Surgery

By adopting the specialist's case-book form of presentation of the treatment of injuries and diseases of steelwork by manual operation, Mr. H. H. Hollis, of the Oxley Engineering Co., Ltd., has provided the Gas Industry with an extremely useful work in *Metal Surgery*, a 44-page treatise on the utilization of arc welding in the repair and maintenance of gasholders and other gas-works plant. Its publication is well timed, too, for the exigencies of the times make repairs difficult, and the fuel situation calls for every ounce of effort to economize. The book is based on a Paper which the Author presented in summary to the Institute of Welding at Leeds in 1942, and which was subsequently published in full in *Welding*.

From over 40 years' experience in the design, fabrication, and erection of the orthodox riveted gasholder, Mr. Hollis is convinced that electric welded plant will supersede the old riveted type, thereby reducing to a minimum the need for metal surgery. In major operations highly skilled operators are essential, supported by fully qualified technicians, who must not only be experienced in the art of electric welding, but must be *au fait* with the design and working of the plant on which welding operations are carried out. In instances where work has to be carried out on plant in commission, the necessary safety precautions must be taken. There are, however, many minor operations which can be undertaken by an average welder without the supervision of highly qualified technicians, and many of the cases cited will be of value to such welders. The most important point concerning metal surgery is that many operations can be performed with the gasholders in commission, and, in the majority of cases, with the water in the tank. Of the 19 "cases" described, comprising both major and minor operations, several were air-raid casualties. For the help of students, the Author deals in an appendix with important points in the form of question and answer. Colonel W. M. Carr contributes a brief foreword, in which he pays tribute to the Author as a pioneer in the application of electric welding for the fabrication of plated steel structures, and says the book will be welcomed by all engineers in the Gas Industry.

Storage of Micro-Film

The use of micro-film for the reproduction of documents has become very common due to wartime conditions, and the safe storage of the micro-film is a matter of some importance. It is therefore of interest to note that some recommendations for the storage of micro-film have recently been issued by the British Standards Institution. These recommendations relate to the containers for storing strips of acetate micro-film not exceeding 100 ft. in length under average atmospheric conditions prevailing in Great Britain.

Two main types of container are dealt with, the one type being suitable for film in roll form, and the other being suitable for flat strips of film. Recommendations are also made regarding the actual storage of the film in the container.

These recommendations are contained in British Standard No. 1153-1944, copies of which may be obtained from the Publications Department of the British Standards Institution, 28, Victoria Street, S.W. 1, price 1s. post free.

Service Organization*

By R. J. PEPPER, Gas Light and Coke Company

THIS Paper has been prepared to describe briefly the Consumer Service Organization of the Gas Light and Coke Company. It is realized that any such organization must be sufficiently flexible to be able to accommodate new ideas and changing conditions, and the one described has been slowly built up with satisfactory results.

The necessity for rendering better service to the consumer has been more and more generally realized by the Gas Industry, but with few exceptions undertakings do not appear to have paid sufficient attention to the actual organization of consumer service, but have contented themselves by allowing it to be subsidiary to sales of appliances to points already occupied by gas.

The following definition of service is quoted from an American Gas Association meeting held in 1937: "Successful Customer Service is rendered by conducting all the phases of a business in such a manner that the customers both acquire and retain a feeling of satisfaction between the company dispensing fuel and themselves."

Practically every department renders a service to the consumer and a good fuel service is dependent upon many factors, such as constant pressure, a sulphur and gum-free gas, constant calorific value and specific gravity and flame characteristics, but this Paper assumes that these are already well on the way to being achieved by the works and distribution departments, and it describes the organization of consumer service after the gas has entered the consumers' premises or the service dealing with the utilization of gas.

Consumers are not interested in gas as a fuel, but judge and assess its value by the service it renders them in cooking food, heating water, warming rooms, &c., together with its application in industrial and commercial processes, and it is not sufficient merely to provide an efficient fuel, but appliances must also be efficient, pleasing to the eye, and installed as inconspicuously as modern fitting practice allows and with every possible refinement. It is also important that in selecting appliances due regard is paid to the requirements of maintenance after installation. The provision of a trouble-free appliance is a service in itself in that it saves the consumer, among other things, time, uncertainty, and the cost of the maintenance which otherwise must be provided and paid for by him directly or indirectly.

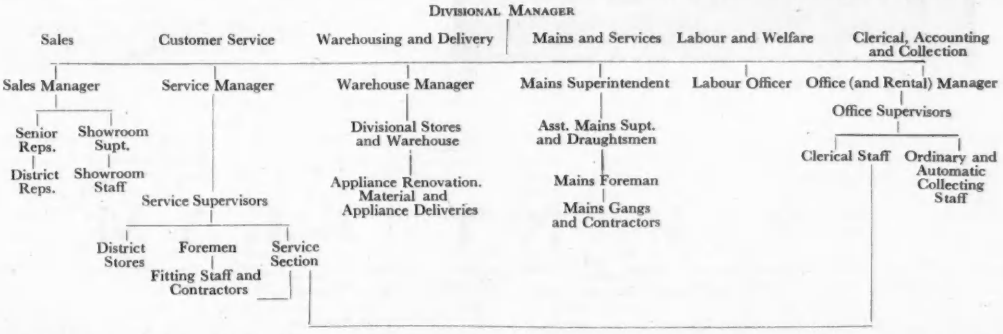
Service Supervisors

In 1935 the Gas Light and Coke Company generally introduced Service Supervisors to organize and control consumer service on the district. Recruitment was from their District Representatives with technical qualifications, Senior Foremen, and technically qualified men from other industries, and this organization is described in detail. The Service Supervisor is considered to be a senior executive officer in the area within which he operates.

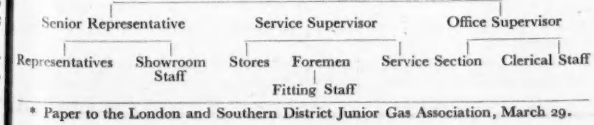
In some Divisional areas the Service Supervisors are controlled by a Service Manager. The Service Supervisor controls the Foremen, Storekeepers, and workmen, who deal with approximately 50,000 consumers, the number being dependent upon the size and type of area.

Divisional Management

It will be necessary to look briefly at the Divisional Organization in diagrammatic form to obtain a picture of a Service Supervisor *vis-à-vis* the other staff. The Divisional Organization deals with approximately 250,000 consumers, and is controlled as the accompanying explanatory chart.



Before the general introduction of this form of organization in 1938–39, the control was at local offices and fitting depots or small groups of local offices and depots and was as follows:



* Paper to the London and Southern District Junior Gas Association, March 29.

The Local Manager dealt with approximately 50,000 consumers—the Mains, Rental Department, and Warehouses were separate departments.

This latter organization would probably be applicable to many undertakings, but in my opinion, in the smaller concerns the Service Supervisor could also control the Mains and Warehouse Departments and carry out the duties of Labour Officer. In such cases no additional responsibilities should be given to him, as this Paper clearly explains that the control of consumer service necessitates the whole-time attention of a competent representative of the management.

Functions of a Service Supervisor

The following, briefly, is the work carried out by a Service Supervisor:

1. Giving technical training and advice to Foremen and Fitting Staff on the district.
2. Giving technical advice to Representatives.
3. Giving technical advice to contractors and "own" fitters.
4. Certifying all contractors' requisitions, authorizing payment. (Certification is withheld until jobs are completed to specification.)
5. Organizing and effecting economies in labour.
6. Follow-up on out-of-stock items.
7. Reduction of cost of installation and maintenance work.
8. Ensuring the efficient and proper use of tools.
9. To ensure that the Service Section functions efficiently.
10. To report to the Management on all injury to consumers or damage to their property when claims against the Company may be involved. The Service Supervisor does not actually settle the claim, but merely issues a report.
11. To represent the Company at Coroners' inquests where evidence of a technical nature may be required.
12. Liaison with research and testing staff.
13. Control of meter reading.
14. Liaison with Home Service Advisers.
15. District Stores Control.
16. Arranging special installations.
17. Estimating large installations.
18. Reporting on performance of appliances.
19. Suggesting improvements to appliances.

Relationship of Service Supervisor to Sales Representatives

District Representatives are controlled by the Senior Representative, and their contact with the Service Supervisor is usually made through him, so that if a District Representative requires technical advice he applies to the Senior Representative, who then consults the Service Supervisor. This arrangement works very well in practice because many such technical queries can be answered by the Senior Representative without reference to the Service Supervisor.

Regarding the installation of appliances to the District Representative's specification, it will be appreciated that the District Representative's instructions may have to be varied due to additional knowledge of the premises gained by the fitter or foreman, and if the latter is of the opinion that the type of appliance, as ordered, is not suitable for the job, or will not function satisfactorily as arranged—*i.e.*, insufficient head of water, inadequate gas supply, &c.—he stops the job and refers to the Service Supervisor. The matter is then taken up by him with the Senior Representative, who arranges for the District Representative to amend the job. It will be seen, therefore, that the work of all District Representatives is under technical control.

This procedure is an improvement on a foreman acting directly under a superior who is also the arranger of the job, as his advice may not always prove acceptable.

Service Section

The introduction of Service Supervisors has resulted in the development and general adoption of Service Sections throughout the Company

"OPERATED PERFECTLY

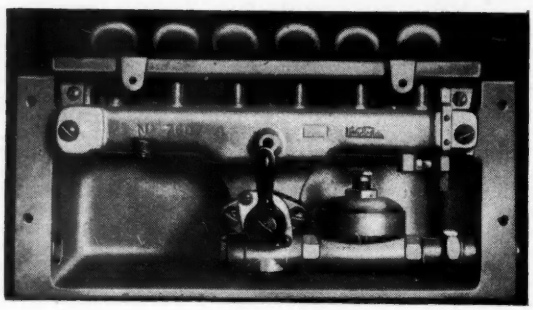
whereas nearly all other appliances were practically unusable....."

A Gas Engineer and Manager writes of the 'Silent Beam' in a recent issue of the 'Gas Times':

"DISTRICT PRESSURES

"Dear Sirs,—In your interesting article on Rome's Gas Supply in the 'Gas Times' of February 12, I note that distribution pressures are between the limits of 3.2 in. and 1–2 in. during the day load.

"It is interesting to note that recently we were obliged to reduce our district pressures to 2 in. for a short period, and it was observed that Radiation "Silent Beam" fire—which I believe is governed to work on 2 in. pressure with flat flame burners—operated perfectly, whereas nearly all other appliances were practically unusable. In view of the extended use of flat flame burners on cookers, etc., after the war, it would seem that appliances designed on these low pressures would be of great benefit to the distribution side of the industry, where the problem of fluctuating district pressures is almost as vital as the sulphur removal problem.



Yours faithfully, ENGINEER."

SILENT BEAM

Gas Fires

to facilitate consumer service. The Service Section is situated preferably within the same office which contains the foreman, and it has the following functions:

1. To receive all appliance complaints and general service requests:
   (*a*) By telephone or post direct from the consumer.
   (*b*) Indirectly, *via* the showrooms and District Representatives.
2. To receive from District Representatives all installation jobs.
3. To allocate, day by day, the work to be carried out by the installation and maintenance fitters.
4. To issue from the files the periodical servicing jobs of all types.
5. To check fitters' reports on job tickets and maintenance job leaves.
6. To distribute labour, in conjunction with the Senior Foreman, to the best advantage.
7. To prepare service data, control charts, and graphs.

There is a Senior Service Clerk in charge of the Clerical Staff, and this staff is supervised by the Office Supervisor, leaving the Service Supervisor responsible for all other matters connected with the Section.

One of the chief results of the introduction of the Service Sections was the more effective use of the available labour. Labour requirements under this scheme can be accurately assessed and surplus disposed of, or additional labour obtained by a system of depot transfer. Estimated hours of work are expressed in man days and based on the known average productive time per man. Within the depot men may work for any foreman depending upon the concentration of work at any time. Sufficient work is issued each day to men to allow for cases of "No entry," &c.

Allocation of work by Service Clerks, however, needs considerable care in order that it is issued to those men who are best qualified to carry out the various types of work, with suitable routing to avoid undue travelling. The work passes to the men *via* their foreman, whose duty it is to ensure satisfactory allocation.

Allocation by the Clerical Staff permits a foreman to spend a larger proportion of his time in his supervisory function on the district.

Emergency Organization

Gas escapes are given priority over all other jobs, a special job ticket known as a "Z" ticket being provided for this purpose. Provision is made so that any escape, unless it is certain it has been brought under control, is given immediate attention day or night.

Other serious complaints, such as water leaks, stoppages in supply, defects preventing cooking, refrigeration, heating, &c., are also dealt with without delay.

The Emergency Organization can be described briefly under two headings:

(a) *Complaints Received During Normal Hours.*

Maintenance fitters and selected installation fitters either attend or telephone the depot according to a rota so arranged that a man is available every 10 to 30 minutes according to the nature of the area served. No man 'phones or calls more than twice in one day, otherwise his work would be unduly interfered with. The rota is designed also having regard to geographical sequence and to avoid undue travelling; a complaint may be left until its situation coincides with the area from which the man telephones unless, of course, it is vital that immediate attention should be given to it.

A brief outline only is given because local conditions afford so many variations.

(b) *Complaints Received Outside Normal Hours.*

The following scheme operates generally on the Company's area and has proved very satisfactory.

Three fitters per depot are selected who possess the London Region "B" classification for Gas Fitters and have experience in dealing with appliance complaints. They must reside within reasonable proximity of the depot, have a telephone installed in their homes at the Company's expense, and supply and ride a cycle.

These three Standby Fitters work on a weekly rota, which consists of a duty man, first reserve, and second reserve.

On the following week the first reserve becomes duty man, the second reserve first reserve, and the duty man second reserve, and so on.

When a complaint is received by the watchman (or any other person who may attend the emergency 'phone outside normal hours) and it necessitates urgent attention, the duty man is telephoned the details, and he then proceeds straight to the consumer's premises and deals with the complaints.

If a second complaint is received during his absence the first reserve is called out, and then if a third complaint is received the second reserve is called out. However, in actual practice these reserves are seldom called except during Saturday and Sunday mornings in certain areas.

When a duty man or reserve returns home he immediately 'phones the watchman to advise that he is again available for duty. All calls are recorded at the depot in a Night Complaint Book—details of times received and issued being endorsed against each entry. These are subject to scrutiny day by day to ensure no unnecessary delay occurs in attention to complaints.

(*To be continued*)

Yorkshire Juniors

There was an excellent attendance of members at Sheffield on March 25, when the Yorkshire Junior Gas Association held their General Meeting.

The meeting opened with a tour of the Neepsend Works of the Sheffield and District Gas Company. After the various parties had toured the Works they congregated in the works canteen, and the President, Mr. V. J. J. Siddons (Rawmarsh), took the Chair. Mr. J. Bateman, Superintendent of the Neepsend Works, gave a brief talk on "Wartime Experiences in Personnel Control."

Mr. F. H. Nicholls (York) proposed a vote of thanks to Mr. Bateman, and this was seconded by Mr. M. Hamshaw (Huddersfield).

Mr. F. Beaumont (Meltham) proposed that the best thanks of the Association be accorded to Mr. R. Halkett, Director and General Manager, for his kindness in granting the facilities to hold the meeting, also to Mr. R. Halkett, jun., for the splendid arrangements which had made the visit so interesting.

Mr. R. Halkett, jun., replied.

Diary

April 14.—Manchester District Association of Gas Engineers: Annual Meeting, Midland Hotel, Manchester, 2.30 p.m.

April 14.—Institution of Chemical Engineers: Annual Meeting, Connaught Rooms, W.C. 2, 11 a.m. Presidential Address of F. A. Greene; Luncheon 1 p.m.; J. Arthur Reavell Lecture by J. G. Bennett on "Coal and the Chemical Industry," 3 p.m.

April 14.—North British Association of Gas Managers: Spring Meeting, Glasgow, 10.15 a.m. Presidential Address of Mr. R. Fife.

April 14.—B.C.G.A.: Domestic Heat Services Committee, Gas Industry House, 2.30 p.m.

April 17.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m.; Gas Industry House.

April 18.—British Gas Federation: Special General Meeting, Gas Industry House, 3.30 p.m.

April 18.—Central Executive Board of the National Council: Gas Industry House, 2 p.m.

April 19.—Midland Association of Gas Engineers and Managers: Meeting at Birmingham University, 10.15 a.m.

April 19.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.

April 20.—Institute of Fuel: Institution of Mechanical Engineers, 2.30 p.m. Paper by Dr. A. Parker on "The Organization of a Research Department."

April 26.—Association of Gas Corporations: Finance Committee, 2 p.m.; General Purposes Committee, 2.30 p.m.; Council, 3.30 p.m.; Annual General Meeting, 4 p.m., Gas Industry House.

April 29.—Yorkshire Junior Gas Association: Meeting at the New Wortley Works of the Leeds Gas Department. Paper by C. J. Dougherty.

May 3.—Southern Association of Gas Engineers and Managers (Eastern District): Gas Industry House, 2.30 p.m. Paper by C. B. Frisby on "Industrial Psychology in Practice."

May 4.—North of England Gas Managers' Association: Annual Meeting, County Hotel, Newcastle, 2.15 p.m. Presidential Address by Mr. J. W. Pallister.

The Canadian Gas Association's 37th Annual Convention will be held in Ontario on June 8.

The Combined Annual General and Spring Meeting of the Midland Association of Gas Engineers and Managers will be held at Birmingham University at 10.15 a.m. on April 19. The incoming President, Mr. T. F. E. Rhead, will give his Address. Luncheon in the Great Hall will be at the invitation of the Chairman and Committee of the Birmingham Gas Department, and inspection of the Departments of Mining and Coal Utilization and of Oil Engineering will follow.

On p. 444 of the "JOURNAL" of April 5, in our monthly table of quotations on the London and Provincial Stock Exchanges, the capital issue of Associated Gas and Water Undertakings, Ltd., was given as £583,407. The London Stock Exchange this year extended their Official Quotation of the Company's stock a further £308,257, and the figure is now £891,664.

An Increased Allocation to the co-partnership bonus as the result of a successful year's working was announced at the annual meeting of the Co-partnership Committee of the Cardiff Gas Light and Coke Company on Mar. 23. The increase amounted to £1,000, making a total of £7,268, which, together with the undivided balance from the previous year, enabled a distribution of bonus to be made at the rate of 7% on salaries and wages for 1943. Mr. R. H. Williams, the Chairman, stated that £1,979 was deposited in the savings account during the year, and Ordinary Stock of the Company had been acquired for the investment of co-partnership bonus amounting to £2,807. Forty-nine additional co-partners had been admitted.

GAS PRODUCTS PRICES—STOCKS AND SHARES

The London Market April 10.

A new Government Order came into effect on March 1 controlling the price of Benzole and Coal Spirit and replacing the Control of Coal Tar Naphtha and Xylole Order, 1943.

The new Order is known as the Control of Benzole and Coal Spirit Order, 1944 (S.R. & O. 1944, No. 172).

By this new Order the price of Motor Benzole is fixed at 2s. per gallon. The new Order also lays down the method of evaluating Crude Benzole.

The Order also calls for periodical returns to the Ministry of Fuel and Power from all producers of Crude and Refined Benzole.

The only item of interest to report in connection with the Coal Tar products market is the issue of Government Order designated the Control of Toluene (No. 4) Order, 1944 (S. R. & O. 1944, No. 170), which contains an amendment of the Control of Toluene (No. 3) Order, 1943.

Prices of Coal Tar products are unchanged.

The Provinces April 10.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 11d. to 2s. 1d., pure, 2s. 7½d. (controlled by the Control of Toluene No. 3 Order, dated July 14, 1943, operative from July 20, 1943). Benzole and Coal Spirit, also Coal Tar Naphtha and Xylole, are now controlled by the Control of Benzole and Coal Spirit Order, 1944, dated Feb. 18, 1944, S. R. & O. 1944, No. 172, operative from March 1. Carbolic acid, 60's, naphthalene, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland April 8.

Production finds a ready outlet with prices unchanged. Refined tar*: Yield to distillers is 4½d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil,* 5⅞d.; low gravity or virgin oil,† 7¼d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha†: 6½d. to 7d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 8d. and 90/190 Heavy naphtha, Unrectified, 1s. 10½d.; Rectified, 2s. 2d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade 15s. per gallon.

* Price controlled. † Uncontrolled.

The tone of the stock markets last week was firm and the number of markings each day exceeded those of the previous week. British Funds were well supported and prices hardened while Dominion Government stocks also strengthened. There was more activity in the industrial market, but here movements were mixed.

There was a little more business in the Gas Market, and prices on the whole were maintained with few changes either way. In the Official List the only alteration of note was the drop of 4 in Commercial ordinary. A feature in the Supplementary List was the sharp rise of 22 points in Eastbourne "B" Stock, which changed hands at 95. The last recorded transaction was nearly a year ago at 45, although since then the price has been steadily improving. No dividend has been paid since June, 1940.

The following is the list of price changes:

SUPPLEMENTARY LIST

Cheltenham Ord.	98—103	+2
Eastbourne "B"	90—95	+22
Romford 4 p.c. Deb. (x.d.)	97—102	Mar. 31

OFFICIAL LIST

Bombay	28/6—30/6	+1/6
Commercial Ord.	53—58	−4
Gas Consolidation "A"	19/9—20/9	+−/6d.
Imperial Continental	72—77	−2
South-Eastern Gas Corporation Ord.	20/—21/-	−−/6d.
South Metropolitan 4 p.c. Pref. ...	92—97	+2

PROVINCIAL EXCHANGES

Great Grimsby "A" (x.d.)	160—170	Mar. 27
" " "B" (x.d.)	160—170	"
" " "C" (x.d.)	160—170	"
" " Ord. (x.d.)	14—18	"
Sheffield Ord.	138—142	+1½

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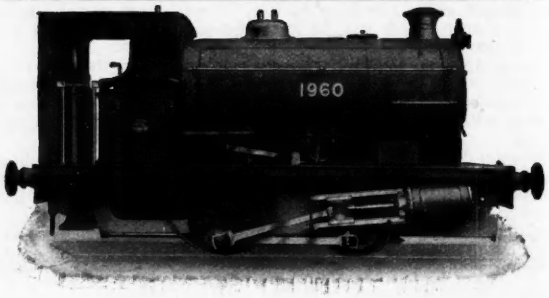

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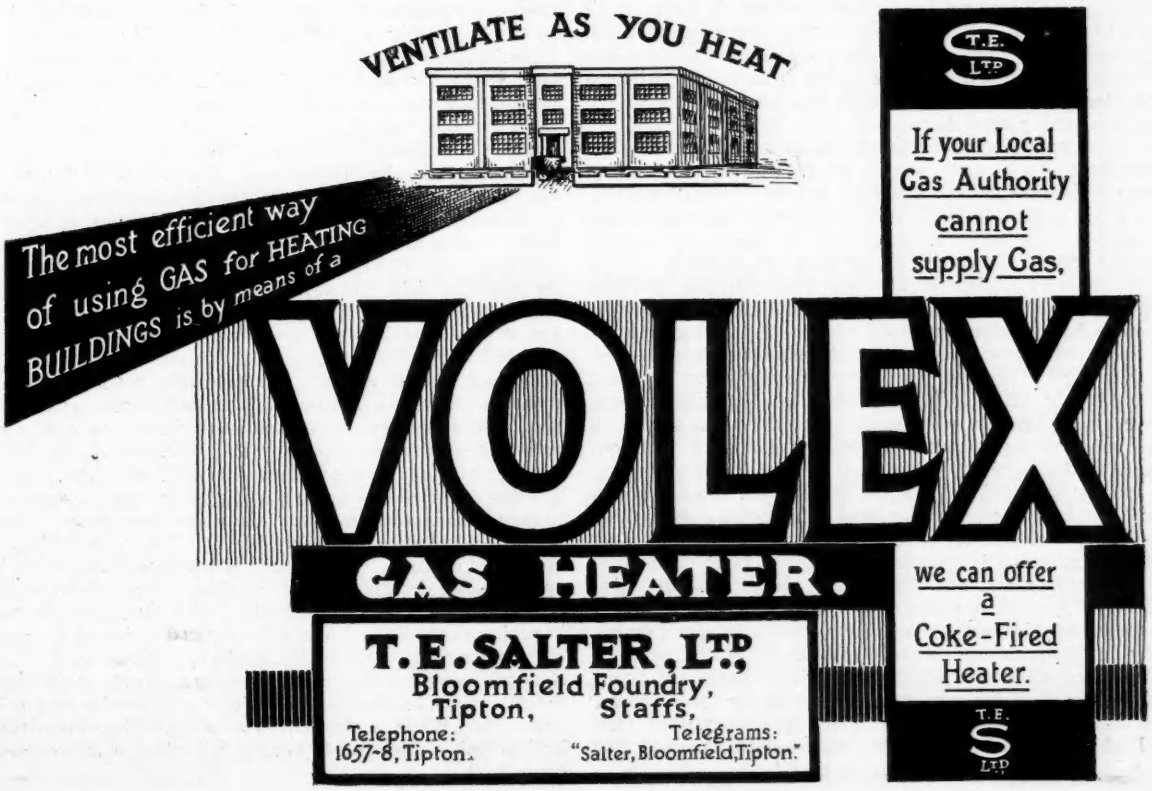
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